

**LEPIDOPTERA NEW TO SHETLAND, 1994-1996**

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THE LEPIDOPTERA of Shetland have probably never received as much attention as they have in the last few years with the establishment of regular trap-sites in the islands. Short notes giving details of some recent records have been published by Riddiford and Harvey (1992), Pennington (1993a) and Pennington and Rogers (1994), but records for the years since 1993 have not been published, partly because of the volume of new information. This paper lists the 86 species recorded in the islands for the first time during 1994-96, a period which included several notable immigrations of migrant insects. The additions take the list of Lepidoptera recorded in Shetland to 286 species. There is no space to include information on several other notable records but a brief annotated Shetland Lepidoptera list has been compiled and will hopefully appear in a forthcoming book on Shetland.

Each of the last three years has been notable for periods of immigration associated with south-easterly winds. In 1994 there were two principle periods of immigration, in early July and early August. The July influx principally involved diurnal species with large numbers of Red Admirals *Vanessa atalanta* (L.) and hoverflies (Diptera: Syrphidae), two Hummingbird Hawk-moths *Macroglossum stellatarum* (L.) and Shetland's first Green-veined White *Pieris napi* (L.), although Bird-cherry Ermine *Yponomeuta evonymella* (L.) was also new to the islands. In early August 1994 there was an influx of more nocturnal species including two species, Crescent *Celaena leucostigma* (Hb.) and Nutmeg *Discestra trifolii* (Hüfn.), which appear to be an important component of any easterly immigration into Shetland. Fourteen species were added to the Shetland list during this period, including some species which may be resident, and some microlepidoptera of uncertain status. The most notable additions were a dead Swallowtail *Papilio machaon* (L.) (Pennington, 1996) and the tortricid *Lobesia abscisana* (Doubl.).

For most of 1995 there was no major immigration although there was a steady trickle of migrants beginning in late July when Shetland's first Double Square-spot *Xestia triangulum* (Hüfn.) was recorded. In September there were several notable records including another Swallowtail, a Clifden Nonpareil *Catocala fraxini* (L.) and the pyralid *Euchromius ocella* (Haw.). There were also large numbers of certain species apparently associated with easterlies in September, such as the Brick *Agrochola circellaris* (Hüfn.), Red Sword-grass *Xylena vetusta* (Hb.) and the Satellite *Eupsilia transversa* (Hüfn.), accompanied by a reasonable influx of Rush Veneers *Nomophila noctuella* ([D. & S.]).

After a relatively quiet start 1996 exploded into activity in early August with a massive invasion of hundreds of millions of Silver Ys *Autographa*

*gamma* (L.) accompanied by a wide range of other species (Pennington 1997). Over 40 species were added to the Shetland list in 1996, most in August, with highlights including Scarce Brindle *Apamea lateritia* (Hüfn.), Dewick's Plusia *Macdunnoughia confusa* (Steph.) and more *Lobesia abscisana*.

All records in this paper are by the authors and unless otherwise stated records from Unst are by Mike Pennington, records from Mainland are by Terry Rogers and determinations are by Keith Bland, with specimens placed in the National Museum of Scotland. Nomenclature and food plants are taken from Emmet and Heath (1991) and wherever comments are made on the status of food plants in Shetland the source of information is Scott and Palmer (1987).

### Systematic list of species new to Shetland

In this list the following status categories are used based on those used by Lorimer (unpub.) and unpublished lists of Shetland Lepidoptera produced by Mike Pennington.

Resident – a species which definitely or probably has a resident breeding population in the islands. Little work has been directed towards locating larvae so sometimes this assessment involves some intelligent guesswork.

Immigrant – any species which does not have a resident breeding population in the islands but which occurs on a regular basis. Some immigrants, such as vanessid butterflies, may breed but they are not resident.

Vagrant – any immigrant which has occurred on less than 20 occasions. This definition of vagrancy is similar to the definition used by birdwatchers and it indicates the rarity of the occurrence. Vagrants may be long-distant migrants well outside their normal range or resident species wandering over a short distance.

Accidental import – any species which has only occurred with the obvious assistance of man's activities.

Status uncertain – any species for which there is not enough evidence to assign a status, usually species which have available food plants in the islands but which have occurred during periods of immigration.

#### GRACILLARIIDAE

##### *Caloptilia elongella* (L.)

Presumed resident: two singles at Eswick, Central Mainland: bred from alder *Alnus*, emerged 24 September 1995, and on sugar, 16 December 1995.

#### YPONOMEUTIDAE

##### *Argyresthia conjugella* Zell. Apple Fruit Moth

Presumed resident: at least four flying at dusk at Eswick, Central Mainland on 8 July 1996.

*Yponomeuta evonymella* (L.) Bird-cherry Ermine

Immigrant: following one caught at Voehead on Bressay on 7 July 1994 (Joyce Gammack) another five were recorded in South and Central Mainland in August 1994 and there were about 20 on Mainland and Unst in August 1996.

*Y. cagnagella* (Hb.) Spindle Ermine

Vagrant: at least four records in August 1996 – Walls, West Mainland on 5th (Billy Watt), Ocroquoy, South Mainland on 7th and 9th (George Petrie) and at least one on Foula on 12th (Sheila Gear).

## COLEOPHORIDAE

*Coleophora mayrella* (Hb.)

Presumed resident: one record only, at light on Fair Isle on 17 July 1994 (Nick Riddiford, det. Maitland Emmet, specimen retained by collector).

*C. asteris* (Mühl.)

Status uncertain, probably vagrant – one record at light at Eswick, Central Mainland on 13 August 1996. The record occurred during considerable immigration and the food plant *Aster tripolium* is extremely rare in Shetland. There are only two previous Scottish records.

*C. versurella* Zell.

New to Scotland. Presumed resident. Singles collected from Eswick, Central Mainland on 7 July and 2 August 1994 and Baltasound, Unst on 5 September 1995. The food plants are various species of Chenopodiaceae which are reasonably common around beaches in Shetland.

*C. vestianella* (L.)

Presumed resident: only record at light at Eswick, Central Mainland on 8 July 1994.

*C. alticolella* Zell.

Resident: fairly frequent on moorland on Foula in July (Frances Ratter).

## ELACHISTIDAE

*Elachista kilmunella* Stt.

Presumed resident: only record, one caught by day on Foula on 28 July 1996 (Frances Ratter).

*E. alpinella* Stt.

Presumed resident: only record, several flying by day on Foula on 28 July 1996 (Frances Ratter).

*E. apicipunctella* Stt.

Presumed resident: only record one at light at Veensgarth, Central Mainland on 1 July 1996 (Paul Sclater).

*E. argentella* (Cl.)

Presumed resident: only record, one caught by day at Norwick, Unst on 30 June 1996.

## OECOPHORIDAE

*Depressaria pastinacella* (Dup.) Parsnip Moth

Status uncertain, probably vagrant: only record, one on sugar at Eswick, Central Mainland on 27 August 1996. This species is usually quite hard to overlook and the only record from Orkney is a suspected migrant (Lorimer unpub.) so this record probably relates to a migrant.

*Exaeretia allisella* Stt.

Status uncertain: one record, at light at Eswick, Central Mainland on 12 August 1994. Although oecophorids are not thought of as migrants there was considerable immigration at the time.

*Agonopterix subpropinquella* (Stt.)

Status uncertain: one record, on sugar at Eswick, Central Mainland on 11 August 1996. Another record which coincided with obvious immigration.

*A. alstromeriana* (Cl.)

Presumed vagrant: one record, on sugar at Veensgarth, Central Mainland on 24 August 1996 (Paul Sclater). This record came on the tail end of a considerable immigration and the usual food plants, *Conium*, are not present in Shetland.

*A. nervosa* (Haw.)

Resident: singles at light at Veensgarth, Central Mainland on 17 August 1996 (Paul Sclater) and Voehead on Bressay on 26 August 1996 (Joyce Gammack), both in the vicinity of established planting of the food plant *Ulex europaeus*, but the first Shetland record on Foula on 19 August 1994 (Frances Ratter) was a presumed vagrant.

## GELECHIIDAE

*Bryotropha politella* (Stt.)

Presumed resident: only record, one caught by day on St Ninian's Isle, South Mainland on 16 July 1996.

*Chionodes fumatella* (Dougl.)

Status uncertain: one record, at light at Ocrabooy, South Mainland on 10 August 1996 (George Petrie). One of a number of species recorded in August 1996 that could be resident but whose occurrence coincided with immigration.

*Scrobipalpa instabilella* (Dougl.)

Vagrant: one at light on Fair Isle on 8 August 1994 (Nick Riddiford, det. Colin Plant, confirmed by the late Eric Bradford, specimen retained by the collector). The food plant *Halimione* is absent from Shetland and there was considerable immigration at the time.

*Scrobipalpa atriplicella* (F.v.R.)

Status uncertain: one at light at Eswick, Central Mainland on 7 August 1994 and about twelve in Central Mainland, Foula and Unst in August 1996. Although this species feeds on Chenopodiaceae, records have coincided with immigration and there are very few other Scottish records, so the species is probably immigrant.

[*Phthorimaea operculella* (Zell.) Potato Tuber Moth

Accidental import: several in an imported bag of Cyprus potatoes on Foula in September 1995 (Frances Ratter).]

#### TORTRICIDAE

*Aethes smeathmanniana* (Fabr.)

Presumed immigrant: singles at light at Ocraquoy, South Mainland on 7 August 1996 (George Petrie) and Eswick, Central Mainland on 22 August 1996.

*Argyrotaenia ljunghiana* (Thunb.)

Presumed resident: only record one caught by day on Hermaness, Unst on 22 June 1995.

*Acleris notana* (Don.)

Status uncertain: singles on sugar at Eswick, Central Mainland and at light at Baltasound, Unst, both on 20 September 1996.

*A. variegana* ([D. & S.] Garden Rose Tortrix

Resident: first located in 1994 but locally frequent in Lerwick, Eswick in Central Mainland and Baltasound, Unst with larvae found on *Rosa* cultivars at the first site.

*A. maccana* (Treit.)

Presumed resident: only records at sugar at Baltasound, Unst on 21 September 1996 and at Eswick, Central Mainland on 24 September 1996. Another montane species occurring near sea-level in Shetland. Although largely found at altitude in Britain there is a record of a suspected migrant from the Faroes (Svend Kaaber *pers. comm.*).

*Hedya ochroleucana* (Fr 1.)

Status uncertain: one at light at Ocraquoy, South Mainland on 10 August 1996 (George Petrie). Another *Hedya* sp. on Foula in August 1994 could not be identified to species due to damage in transit.

*Endothenia ericetana* (Humph. & Westw.)

Status uncertain: only record one at light at Veensgarth, Central Mainland on 10 August 1996 (Paul Sclater). Another record which co-incided with a period of immigration.

*Lobesia abscisana* (Doubl.)

New to Scotland. Immigrant: one at light at Eswick, Central Mainland on 1 August 1994 was generally regarded as an exceptional record, but there were up to 26 at light between 7-18 August 1996, at four sites on Mainland, two sites on Unst and on Bressay. This would seem to establish this species as a migrant which should be looked for at other coastal locations during periods of immigration.

*Bactra furfurana* (Haw.)

Presumed resident: only record at light at Eswick, Central Mainland on 2 August 1994. Although a likely resident it has not been found again and there was immigration at the time of the record.

*Epinotia nisella* (Cl.)

Vagrant: six at light at Eswick, Central Mainland on 11-12 August 1996 and singles at sugar at Sandwick, South Mainland on 14th (Paul Harvey) and at light at Baltasound, Unst on 25 August 1996. The only Orkney records are also suspected immigrants (Lorimer 1983).

*E. maculana* (Fabr.)

Status uncertain: only record at Eswick, Central Mainland in 1996, data lost but most probably in August.

*Rhopobota naevana* (Hb.) Holly Tortrix

Immigrant: up to 23 at light or at sugar at two sites on Mainland, two sites on Unst and on Bressay between 10-26 August 1996. Orkney records have also related to immigrants (Lorimer 1983).

*R. myrtilana* (Humph. & Westw.)

Presumed resident: only record one caught by day at Nibon, North Mainland on 24 June 1995.

*Zeiraphera ratzeburgiana* (Ratz.)

Resident: three singles caught so far in a garden with many planted trees at Eswick, Central Mainland in August 1995 and 1996.

*Z. rufimitrana* (H.-S.)

Presumed resident: singles at light at Ocracquoy, South Mainland on 9 August 1996 (George Petrie) and at Eswick, Central Mainland on 12 August and two of this species from a sample of seven *Zeiraphera* from a plantation at Baltasound, Unst on 28 August 1996. It seems likely that this species has been brought in with recent tree-planting and exists in small numbers alongside the populations of *Zeiraphera diniana* (Guen.) now found at several plantations.

*Z. isertana* (Fabr.)

Status uncertain: only record one at light at Eswick, Central Mainland on 13 August 1996. Unlike other members of this genus, this species has virtually no available food plants in Shetland. Planted oaks *Quercus* struggle to survive and there is just one tiny plant at the capture site. There was considerable immigration at the time of the record.

*Epiblema foenella* (L.)

Vagrant: two records - singles at light on the same night at Easter Quarff, South Mainland (specimen evaded capture) and Veensgarth, Central Mainland on 10 August 1996 (Paul Sclater).

*Eucosma lacteana* (Treit.)

Presumed vagrant: one record, at light at Eswick, Central Mainland on 14 August 1996. The food plant is absent from Shetland.

*E. fulvana* (Stephens)

Status uncertain: singles caught by day at Quendale, South Mainland on 16 July 1996 and at light at Easter Quarff, South Mainland on 11 August 1996. The normal food plants of this species, *Centaurea*, are absent or very rare in Shetland, but it is most likely resident.

## PYRALIDAE

*Euchromius ocella* (Haw.)

Vagrant: one record at light at Eswick, Central Mainland on 17 September 1995.

*Agriphila selasella* (Hb.)

Vagrant: two singles at light at Eswick, Central Mainland on 7 and 14 August 1996.

*A. tristella* ([D. & S.])

Vagrant: one at a lighted window on Foula on 7 August 1996 (Frances Ratter) followed by about five at light at Eswick, Central Mainland between 9-13 August, two each night at Easter Quarff, South Mainland on 11-12 August and one on Fair Isle on 16 August (Elizabeth Riddiford). An unpublished record from Fair Isle in August 1990 is best considered unproven.

*Pediasia aridella* (Thunb.)

Vagrant: one record, at light at Eswick, Central Mainland on 11 August 1996. The second Scottish record, the first recorded by Pelham-Clinton in Midlothian (unpublished but specimen in NMS).

*Platytes alpinella* (Hb.)

Vagrant: one record, at light at Eswick, Central Mainland on 11 August 1996. The only other Scottish record is of four at light at Lunan Bay, near Montrose just four days earlier on 7 August 1996 (Goater 1997). Although these Mainland moths were found in suitable breeding habitat, perhaps they were migrants as well.

*Margaritia sticticalis* (L.)

Vagrant: about 15 records, beginning with two by day at Baltasound, Unst and one at light on Fair Isle (Mark Newell) on 11 August 1996, followed by records at three sites on Mainland and on Bressay and Foula until 22 August 1996.

*Udea ferrugalis* (Hb.) Rusty-dot Pearl

Immigrant: the first record was one at light at Eswick on 6 August 1994, there were four at the same site in September 1995 and 11 in August 1996. In August 1996 there were also records of another five, from two other sites on Mainland and on Foula.

*Pleuroptya ruralis* (Scop.) Mother of Pearl

Immigrant: the first record was one at light at Eswick, Central Mainland on 1 August 1994. On 27 July 1995 there were 13 at two trap sites on Mainland, with a few stragglers the next day. In August 1996 the species was recorded at three sites on Mainland, two sites on Unst and on Foula with a maximum of 33 at light at Norwick, Unst on 13 August 1996.

*Numonia advenella* (Zinck.)

Vagrant: one record, on sugar at Eswick, Central Mainland on 4 August 1994.

*Pyla fusca* (Haw.)

Presumed resident: one at light at Sullom, North Mainland on 24 July 1996 (Brian Elliott, specimen retained by the collector).

## PTEROPHORIDAE

*Platyptilia gonodactyla* ([D. & S.])

Resident: singles at light at Baltasound, Unst on 7 July 1994, caught by day on Fitful Head, South Mainland on 1 August 1994 (Jon and Ad Clifton) and at Ocrabooy, South Mainland at light on 8 August 1996 and indoors on 15 September 1996 (George Petrie).

*Emmelina monodactyla* (L.)

Status uncertain: two records from Eswick, Central Mainland, 16 December 1995 and 20 September 1996. The food plants, *Convolvulus* and *Calystegia*, are absent from Shetland except as garden plants. The only suitable plant at the site was imported as a root many years ago.

## PAPILIONIDAE

*Papilio machaon* (L.) Swallowtail

Vagrant: two records, at Voe on Mainland in August 1994 and on Fair Isle in September 1995 have already been reported (Pennington 1996).

## PIERIDAE

*Pieris napi* (L.) Green-veined White

Vagrant: one seen on Bressay on 6 July 1994 (Dr Chris Smout and John Scott). No specimen was obtained but there was a considerable immigration that day including many Red Admirals *Vanessa atalanta* and hoverflies (Diptera: Syrphidae).

## GEOMETRIDAE

*Timandra griseata* (Peters.) Blood-vein

Vagrant: four records, one at light at Ocrabooy, South Mainland on 11 August 1996 (George Petrie) followed by three singles on consecutive nights at Eswick, Central Mainland on 12-14 August 1996.

*Scopula imitaria* (Hb.) Small Blood-vein

Vagrant: one record, one at Norwick, Unst on 8 August 1994 (Jim Platts, specimen retained by collector).

*Orthonama obstipata* (Fabr.) The Gem

Vagrant: two records, both at light at Eswick, Central Mainland on 23 October 1994 and 18 August 1996.

*Epirrhoe alternata* (Müll.) Common Carpet

Vagrant: one record, on sugar at Eswick, Central Mainland on 11 August 1996 during a period of considerable immigration.



*Thera cognata* (Thunb.) Chestnut-coloured Carpet

Resident: larvae tapped from the food plant on Juniperus on Collafirth Hill, North Mainland in July 1996, the bred specimens being extremely dark (Brian Elliott, specimens retained by the collector). The food plant is very local in Shetland and the moth is unlikely to be found away from the vicinity of this record, although Muckle Roe may be worth searching.

*Eupithecia centaureata* ([D. & S.]) Lime-speck Pug

Status uncertain: three records at light on Foula on 12 August 1996 (Frances Ratter) and at Eswick, Central Mainland on 13 and 22 August 1996. While this species could be an overlooked resident, August 1996 was a time of considerable immigration.

*E. assimilata* Doubl. Currant Pug

Resident: found to be present at Eswick, Central Mainland in June to July 1995 and 1996 with larvae found on *Ribes* there in September 1996.

*E. lariciata* (Freyer) Larch Pug

Resident: found to be locally common on *Larix* at Kergord, Central Mainland in July 1996 (TDR and Svend Kaaber).

*Agriopsis marginaria* (Fabr.) Dotted Border

Resident: bred from larvae collected from the Burn of Valayre, Central Mainland in July 1996, adults emerging in late February 1997 (Brian Elliott, specimens retained by the collector). Intriguingly, geometer moths were reported seen in car headlights a few hundred metres from this site in March 1996.

*Erannis defoliaria* (L.) Mottled Umber

Resident: an infestation of larvae on just about every species of deciduous tree at the plantations at Kergord, Central Mainland was first noticed in July 1996, and males were found flying there in November. The species must have been present for several years given the numbers present, but it is probably a recent arrival brought in with trees planted at the site.

## ARCTIIDAE

*Arctia caja* (L.) Garden Tiger

Vagrant: one at light at Easter Quarff, South Mainland on 28 July 1995 was followed by seven, at three sites on Mainland and on Yell and Unst in August 1996.

## NOCTUIDAE

*Agrotis segetum* ([D. & S.]) Turnip Moth

Vagrant: nine records, all at Eswick, Central Mainland on 15 July 1994, 23 October 1994, four in September-October 1995, 13 June 1996 and two on 24 August 1996.

*Ochropleura plecta* (L.) Flame Shoulder

Status uncertain: three records on Foula on 25 June 1996 and two on 22 July 1996 (Frances Ratter). Presumably an overlooked resident, but possibly a wanderer from nearby populations in Orkney.

*Noctua fimbriata* (Schreb.) Broad-bordered Yellow Underwing

Vagrant: at least eight records, the first at light at Toab, South Mainland on 8 August 1994 (Jon and Ad Clifton) and at light at Eswick, Central Mainland on 30 August 1995, followed by at least six at four sites on Mainland and Unst in August 1996.

*N. interjecta* Hb. Least Yellow Underwing

Vagrant: one record at light at Eswick, Central Mainland on 19 August 1996.

*Xestia triangulum* (Hufn.) Double Square-spot

Vagrant: one record at light at Eswick, Central Mainland on 29 July 1995.

*Lacanobia suasa* ([D. & S.]) Dog's Tooth

Vagrant: about twelve records – one at light at Baltasound, Unst on 23 July 1996 was followed by about 11 at two sites on Mainland and two sites on Unst between 12-16 August 1996.

*Papestra biren* (Goeze) Glaucous Shears

Presumed resident: the only record involves about 12 at light or sugar at Eswick, Central Mainland between 26 May and 13 June 1995.

*Xanthia icteritia* (Hüfn.) The Sallow

Status uncertain, probably vagrant: ten records, all on sugar, and mostly at Eswick, Central Mainland where there were three in early August 1994, three in August to September 1995 and one in August 1996. There were also singles at Veensgarth, Central Mainland (Paul Sclater), Fetlar (Daniel Houghton) and Baltasound, Unst in August 1996. Most of these records are rather early for Scotland, making immigration from earlier flying southern populations more likely.

*Amphipyra berbera* (L.) Svensson's Copper Underwing

Vagrant: one record, at sugar at Eswick, Central Mainland on 11 August 1996.

*Enargia paleacea* (Hb.) Angle-striped Sallow

Vagrant: five records, all on 12 August 1996 - by day at Skaw, Unst (Wendy Dickson), on sugar at Baltasound, Unst and three on sugar at Eswick, Central Mainland.

*Parastichtis suspecta* (Hb.) The Suspected

Vagrant: about 20 records, about 18 on sugar at Eswick Central Mainland on 12-14 and 24 August 1996, and three on sugar at Baltasound, Unst on 13-14 August 1996.

*Cosmia trapezina* (L.) The Dun-bar

Vagrant: over 20 records, about 17 at three sites on Mainland and two on Unst (Jim Platts) between 1-8 August 1994, and another five at Baltasound, Foula and Eswick, Central Mainland on 12-13 August 1996.

*Apamea lateritia* (Hufn.) Scarce Brindle

New to Scotland. Vagrant: two records, on sugar on consecutive nights at Norwick, Unst on 11-12 August 1996. These are the 8th-9th British records. This species was commoner than usual in Denmark in 1996 and was also recorded from the Faroes on 10 August 1996 (Svend Kaaber *pers. comm.*).

*A. ophiogramma* (Esp.) Double Lobed

Vagrant: five records, on sugar at Baltasound, Unst on 7 and 14 August 1996, singles at light and sugar at Norwick, Unst on 12 August 1996 and at light at Eswick, Central Mainland on 12 August 1996.

*Mesoligia furuncula* ([D. & S.]) Cloaked Minor

Vagrant: two records, singles on consecutive nights on sugar at Ocracuoy, South Mainland on 11 August 1996 (George Petrie) and at sugar at Eswick, Central Mainland on 12 August 1996.

*Mesapamea didyma* (Esp.) Lesser Common Rustic

Presumed resident: one record, on sugar at Eswick, Central Mainland on 18 August 1996. The Common Rustic *Mesapamea secalis* (L.) has only been confirmed in the islands from three specimens, although there are several records of *secalis sensu lato*.

*Photedes minima* (Haw.) Small Dotted Buff

Status uncertain: five records at light at Eswick, Central Mainland in late July and early August in each year 1994-96 would suggest a small local population.

*Luperina testacea* ([D. & S.]) Flounced Rustic

Status uncertain: one record, at Norwick, Unst on 4 August 1994 (Jim Platts, specimen not retained).

*Amphipoea fucosa* (Freyer) Saltern Ear

Vagrant: a small influx of over 30 *Amphipoea* between 1-17 August 1994, of which the majority were probably this species, with nine specimens from Norwick, Unst (Jim Platts) and Eswick, Central Mainland confirmed by dissection, as was another from Muckle Roe on 31 August 1994. The Large Ear *Amphipoea lucens* (Freyer), first recorded on Fair Isle in 1991, was also present in this influx and the 14 *Amphipoea* recorded in 1995-96 were all this latter species.

*Spodoptera exigua* (Hb.) Small Mottled Willow

Vagrant: seven records in August 1996, two at Veensgarth, Central Mainland on 13th (Paul Sclater), four at Ocracuoy, South Mainland on 13-16th (George Petrie) and one at Eswick, Central Mainland on 14 August 1996.

*Macdunnoughia confusa* (Steph.) Dewick's Plusia

Vagrant: two records, different singles at light on consecutive nights at Eswick, Central Mainland on 12 and 13 August 1996. There is one previous Scottish record in Orkney in 1969 (Lorimer 1983).

*Autographa bractea* ([D. & S.]) Gold Spangle

Vagrant: one record, flying by day at Baltasound, Unst on 19 August 1996 (Margaret MacLeod). No specimen as the moth evaded capture.

### Amendments

There is no room to list other interesting records but two errors from Pennington and Rogers (1994) need correcting. The gelechiid *Scrobipalpa acuminatella* (Sircom) should be deleted from the Shetland list as the specimens have been redetermined as the tineid *Monopis laevigella* ([D. & S.]). The Red-green Carpet *Chloroclysta siterata* (Hüfn.) should also be deleted from the list as all specimens have now been identified as Autumn Green Carpet *Chloroclysta miata* (L.) (det. Barry Goater and Mark Young). In addition the pyralids *Agriphila geniculea* (Haw.) and *Agriphila inquinatella* ([D. & S.]) referred to in Pennington (1997) should be ignored as they were provisional identifications, now redetermined, while the references to *Yponomeuta padella* (L.) refer to the records of *Y. cagnagella*.

### Discussion

Of the 86 additions to the Shetland list in 1994-96, only about 29 species are believed to be resident. Of these the majority are microlepidoptera, which is not surprising as these moths are always somewhat overlooked. Although many species are known only from a few specimens, they include several very inconspicuous species and several species with spring or early summer emergence which would have avoided capture by visiting entomologists, most of whom visited later in the year. Newly discovered resident macrolepidoptera include five species of geometrid, three probably imported by man along with trees and shrubs (*Eupithecia lariciata*, *Eupithecia assimilata* and *Erannis defoliaria*), one with a very localised food plant (*Thera cognata*) and one flying very early in the year (*Agriopis marginaria*). Two new resident species of noctuid include one which has only recently been recognised as a distinct species (*Mesapamea secalella*), and one which flies early in the Shetland spring (*Papestra biren*), thereby escaping detection by visitors.

In general, macrolepidoptera of uncertain status in Shetland are probably scarce residents which may be immigrants (although *Xanthia icteritia* is more likely to be a migrant). Most of the microlepidoptera of uncertain status, however, are species which have occurred just once or twice during periods of immigration, but which are not accepted migrants and which also have possible food plants available in the islands. It is recognised that these species may be scarce or local residents in the islands recorded during periods of immigration, either through increased observer effort or because they have wandered from their usual range within Shetland. However immigration is a distinct possibility.

Excluding one species known to be an accidental import by man, this leaves 39 species out of our list of 86 additions which are most likely immigrants from outside Shetland. This list of immigrants makes interesting reading. While the two *Yponomeuta* species are well established migrants, members of the Oecophoridae and the Gelechiidae are not usually accepted migrants or even long distance wanderers. Both *Agonopterix alstromeriana* and *Scrobipalpa instabilella* are assumed to be immigrants as their food plants are absent from Shetland and they were recorded during periods of immigration. It is worth noting that most of the other recent additions from these two families are of uncertain status, and several are strongly suspected of being immigrants (e.g. *Scrobipalpa atriplicella*). Even one of the suspected residents, *Agonopterix nervosa*, has been recorded as an immigrant on Foula. Four species of tortricid are immigrants, including *Epinotia nisella* and *Rhopobota naevana* where there is evidence from Orkney to support the theory (Lorimer 1983 and unpub.), and *Lobesia abscisana* and *Epiblema foenella* which are so far outside their normal range that they must be immigrant. The occurrence of one specimen of *L. abscisana* in 1994 was regarded with incredulity by several authorities, but the arrival of more than 20 in August 1996 must lead to some reappraisal of its status. Several tortricids of uncertain status will probably be confirmed as immigrants in the long term (e.g. the records of *Hedya* sp.). Of the nine recent additions to the Shetland pyralid list no less than eight are immigrants. Although some famous migrants are included, such as *Udea ferrugalis*, *Euchromius ocella* and *Margaritia sticticalis*, species such as *Numonia advenella*, *Pediasia aridella*, *Platytes alpinella* are much less expected. These records are however, similar to another previously unpublished record of Thistle Ermine *Myelois cribrella* (Hb.), caught at light on Fair Isle on 12 June 1992 (Nick Riddiford, det. by the late Ian Lorimer).

Butterflies are less surprising immigrants and most of the whites in the family Pieridae are known to wander, as are the continental subspecies of *Papilio machaon*. It is worth noting that of 13 species of butterfly on the Shetland list only one is resident (Pennington 1993b). Many species of macrolepidoptera are also known to wander widely even if they are not established migrants although the geometrids are generally less mobile. The recent additions to the Shetland list include one well known migrant (*Orthanoma obstipata*), another for which some degree of wandering is well established (*Timandra griseata*) and two slightly more surprising species (*Scopula imitaria* and *Epirrhoe alternata*). Only four of the nine additions to the Shetland geometrid list are suspected immigrants, but no less than 16 of the 22 additions to the noctuid list fall in this category. Most of the noctuids added to the list are known migrants or have a known tendency to wander, with *Amphipyra berbera* perhaps the most surprising name on the list.

The word immigrant has been used advisedly in this account, and in preference to the word migrant whenever possible. Migration is a term that is

difficult to define when working with insects, as discussed by Young (1997). Young tried to make a distinction between migration, implying a definite directional movement from one specific place to another and dispersal, which is more random and usually over a shorter distance. However, he acknowledged the problems with these definitions, while Baker (1982) drew no distinction and termed all movements from one spatial unit to another as migration. The term itinerancy is advocated by Parsons (1996) as better suited to describing the more random and less intentional movements of insects. However, as immigrant merely implies an arrival from outside an area, this term seems especially appropriate for use when discussing an isolated island group such as Shetland.

If one ignores the island of Fair Isle, Shetland is more than 50 km from the nearest land, and this is also an island group, the neighbouring archipelago of Orkney. Shetland is almost 200 km from the mainland of Scotland and over 300 km from Norway. Clearly any immigrant moth has travelled over a considerable distance before it reaches Shetland, even if it has come from the nearest land. However, the conditions most suitable for immigration into the islands, whether it involves birds or insects, always coincide with south-easterly winds. There is plenty of evidence to show that birds which arrive in Shetland in south-easterlies have been deflected from a crossing of the North Sea and many originate in southern Scandinavia or the Low Countries (see for example Robertson, 1980). It seems highly likely that many of the moths and other insects that occur in Shetland during south-easterly winds originate in similar areas. Back-tracking of the moths involved in the peak of the 1996 influx on 13 August suggested an original departure from continental Europe in Denmark or the southern Baltic (Davey, 1997). Some moths may of course originate further east and there is some evidence to support this theory (Bretherton, 1983).

Wind directions away from the south-eastern quadrant are much less productive. If the wind moves into the north-east the temperature tends to drop, inhibiting insect activity, while bird immigration also tends to be minimal. If the wind moves to the south relatively few insect migrants arrive in Shetland, presumably because the landmass of Britain lies in the way and intercepts most long-distance immigration. A few long distance migrants such as *Vanessa atalanta* or *Orthonama obstipata* may occur in southerly winds and a few moths have occurred which may have wandered from the north of Scotland, such as *Agrochola circumcellaris* or *Amphipyra tragopoginis*. However, even these species occur more regularly during south-easterlies.

If most of the immigrant moths arriving in Shetland leave land in the south-east corner of the North Sea in the vicinity of Denmark this would require a minimum sea-crossing of about 800km, although some species may originate even further east. While this is now accepted as a reasonable distance for the known migrant species such as *Plutella xylostella* (L.), *Autographa gamma* or *Vanessa atalanta*, it is a considerable distance for

dispersing or itinerant species. Although several of the more interesting records are not proven to be immigrants, it is certainly worth considering the idea that even some sedentary species may be capable of longer distance movements than is currently accepted. It may be that some of the moths have been "caught up" by a passing migration. It is accepted that most species have some sort of dispersive period and possibly a large-scale migration occurring when they are in this phase may attract them in some way and lead to a greater dispersion that would occur in normal circumstances. It is interesting to note the range of unexpected immigrants recorded in 1994 and 1996 which feed on coastal or saltmarsh plants (e.g. *Coleophora asteris*, *Scrobipalpa atriplicella*, *Scrobipalpa instabilella*, *Eucosma lacteana*, *Pediasia aridella*, *Platytes alpinella*, *Apamaea oblonga* (Haw.)). If these species had got caught up with a movement crossing the Danish coast in a south-easterly they would be carried out to sea very quickly, with Shetland probably the first landfall. This is supposition of course, but it is difficult to see why these species turn up in Shetland otherwise. Svend Kaaber (*pers. comm.*) has confirmed that most of the vagrants and possible vagrants recorded in Shetland over the last few years are common in the coastal areas of the south-east North Sea around Denmark and adjoining areas.

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### BOOK REVIEW

**Grasshoppers and Crickets of Essex** by Alan Wake. 57 pages, 34 maps, 8 coloured plates. A5, folded and stapled. ISBN 0410 993X. Colchester Natural History Society, 1997. Available from Museum Resource Centre, 14 Ryegate Road, Colchester, Essex, CO1 1YG. £6 inclusive of postage.

Historically, grasshoppers and crickets are a much neglected Order of insects in Britain and with such a high proportion of British species concentrated in the south of the country it is fitting that a southern-county fauna of this nature should be briefly reviewed in a national journal. As with most county works nowadays, distribution is presented on the basis of tetrads (2km x 2km squares), but a very interesting addition in this work is an Appendix of maps showing distribution by monads (1km x 1km squares); this gives a much more accurate representation of the true spread of each species in the county and is most helpful.

However, this work is rather more than just a set of maps. An Essex Orthoptera checklist is followed by a history of Essex grasshoppers and crickets which makes quite interesting reading. A further chapter introduces the survey; two maps summarise numbers of species by ten-kilometre grid square and a table is presented giving a year by year summary of numbers of records of each species from 1980 to 1991. Short but useful accounts for each of the sixteen species present today in Essex follow. A centre-fold of four pages containing eight coloured plates illustrates the work. An interesting addition is a section which now follows listing historical records not re-found during the present day survey. The work concludes with a chapter on key grasshopper and cricket sites in the county.

All in all this is a useful work of reference. Although primarily of local interest, it may have a wider appeal, at least to entomologists in the southern part of Britain.

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